



Socioeconomic Study of Climate Change and its Impacts on Livelihoods of People Living Around the Coastal Areas of the Gambia

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Abstract

The research aims to assess the effects of climate change on the livelihood of people living around the coastal areas and coping strategies used. The study uses a quantitative method with semi-structured interview questionnaire and convenient sampling method and conducts a survey of coastal community residents in Banjul, Barra, Bakau, Tanji, Sanyang, Gunjur, and Kartong and uses a descriptive analysis. Majority of respondents are self-employed as fishermen, and fish dryers, fish smokers, ship builders and boat riders. Most of the borrowing is done individually and the line of credit is mostly below D20,000 and more than 85% receive less than that amount. More than 60% of the respondents have no access to land and 4.71% stated that they do not have access to water. Most of the respondents rank their friends as their source of borrowing followed by families and banks. About 93% stated that it takes them less than 40 minutes to get to the nearest health facility. Adaptation strategies employed to deal with health problems during variable and extreme climate are going to hospital, cleanliness, eating healthy using herbal medicine. More than 85% of the respondents did not experience shortage of food in a year. But price of food has been increasing over the last 5 years. Finally, respondents favored adaptation strategy is saving followed by involving in other livelihood activities, government assistance, cleaning the environment, tree planting and protection of coastal areas.

Keywords:

*Climate change
Socioeconomic
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1. Introduction

The Gambia is a small country lying on the Western Coast of Africa within the latitude of 13 to 14 degrees north of the equator. It is a narrow strip of land divided into North and South Banks by The River Gambia, which extends inland for more than 400 kilometres on both banks of the river with varying widths ranging from 24 to 28 kilometres away from the borders with Senegal, covering an approximate land area of about 11000 square kilometres. It is bordered on the North, South and East by the Republic of Senegal and on the West by the Atlantic Ocean. The country has a population of 2.101 million (World Bank, 2007)¹. With 176 people per sq. km, it is one of the most densely populated countries in Africa. Most of the population (57%) is

¹ The Gambia Overview: Development news, research, data | World Bank

concentrated around urban and peri-urban centres. The Gambian economy is small and hence relies primarily on tourism, agriculture and remittances, which are vulnerable to external shocks.

The Gambia has 80 km of open Atlantic coast from Buniada Point in the north to the mouth of the River Allahain in the south. Banjul is recognized as the most vulnerable city to sea level rise followed by Barra and Bakau. In fact the whole coastline is sensitive with sandy shores and clayed cliffs. Most of the government infrastructures, businesses, tourism facilities and high value private properties are found within the coastal area. The Gambia is particularly vulnerable to possible climate change threats including sea level rise, coastal erosion, increasing saline intrusion and flooding.

Climate change refers to a change in the state of the climate that can be identified by changes in the mean and or the variability of its properties and that persists for an extended period, typically decades or longer (IPCC, 2007). Climate change affects the livelihood of coastal communities. Climate change will have both a direct impact on development of climate-dependent activities (such as infrastructure and agriculture) and indirect consequences for social systems (such as issues of poverty, conflict, health and education). As a result, climate change has the potential to undermine, and even undo, socio-economic development in East Africa (Orindi & Murray, 2005).

Gambia Coastal zone is inhabited by 14 communities with a total population of 14 coastal communities is 172,000 according to the 2013 census. Banjul, capital city of the Republic is the most populous settlement followed by Bakau. The four settlements (Banjul, Bakau, Brufut and Gunjur) accounts for 59% of the total coastal population Coastal communities are urbanized and more than 90% are in urban residence. Most of the fishing, trading, tourism, services as well as secondary sector activities of the Gambia are found within 1km radius from the shoreline.

The research answers the following questions: What are their socio-economic characteristics of coastal residents? What is local communities' knowledge of climate change effects and process? How does it affect their livelihoods? And how do they cope with and what are their priority adaptive solutions?

The objective of the study is to assess the effects of climate change on the livelihood of people living around the coastal areas, social networks from climate change threats, and assess adaptation strategies.

Some constraints that may be considered when assessing community resilience to climate change threats include the levels of education and skills, range of employment and income sources, access to productive lands and resources, availability of public services and credit facilities, among others.

2. Literature Review

Several studies have been carried out to examine households' perception of climate change (Acquah, 2011; Aphunu & Nwabeze, 2012; Ayanwuyi, Kuponiyi, Ogunlade, & Oyetero, 2010; Combest-Friedman, Christie, & Miles, 2012; Devkota, Bajracharya, Maraseni, Cockfield, & Upadhyay, 2011; Haque, Yamamoto, Malik, & Sauerborn, 2012; Tambo & Abdoulaye, 2013). These studies are useful in understanding different approaches that may be used in assessing households' perception to climate change in local communities as well as their determinants thereof. A central methodological approach used by these studies is to obtain primary data on several variables such as socioeconomic characteristics of households in the study area (age, sex, educational level, marital status, ethnicity, household income, etc); perceptions of change in climatic variables (rainfall, temperature, storm frequency, etc.); and other indicators of exposure to climate change (e.g. health, floods, crop yield, etc.) using questionnaires, structured interviews, or focused group discussions. The perceptions of households are then assessed using descriptive statistics of the variables obtained.

The impacts of climate change can be broadly grouped under three headings: ecological, social, and economic. The ecological impacts of climate change include shifts of vegetation types and associated impacts on biodiversity (Elliott & Baker, 2004); change in forest density and agricultural production (Adams et al., 1990; Smith, Martino, & Cai, 2007); expansion of arid land (Karl, Melillo, & Peterson, 2009); decline in water quantity and quality (Milly, Betancourt, & Falkenmark, 2008); effects on aquatic species and ecosystems (U.S. Environmental Protection Agency (EPA), 2008) and stresses from pests, diseases and wildfire (Alig, Adams, Joyce, & Sohngen, 2004; Gan, 2004). Social impacts may include changes in equity, risk distribution, human health impacts, and relocations of populations (Karl et al., 2009). Economic impacts include increased risk and uncertainty of forest and agricultural production (Smith et al., 2007); alteration in productivity for crops and forest products (Feng & Hu, 2007); changes in supply of ecosystem goods and services (Sohngen & Sedjo, 2005); altered cost of utilities and services (Scott & Huang, 2007).

3. Methodology

The Methodology used in the study is quantitative in nature and uses descriptive analysis. For conducting this study a semi-structured interview questionnaire was used to obtain quantitative data from villages along the coastal communities. The survey involved the design and administration of questionnaires through personal interviews on randomly selected men and women in each of the coastal communities selected for the study. The selection of individuals to be surveyed was based on convenience sampling methods. Surveys were administered in Banjul, Barra, Bakau, Tanji, Sanyang, Gunjur, and Kartong to gather information on

individual characteristics, livelihood strategies, social networks, sensitivity to health, sensitivity to food, sensitivity to water, sensitivity to exposure and adaptation scenarios.

297 questionnaires were administered on fishermen, fish dryers, fish smokers, shop owners, drivers, boat builders, farmers, hotel workers, and others. The target sample size was 300 individuals whose livelihood depend on the coastal activities and face possible threats of climate change. There are few non responses and the response rate is 99%.

4. Analysis and Discussion of Results

The results from the study using the individual survey questionnaire are summarized here. The survey highlighted the livelihood activities in the coastal areas, the socioeconomic characteristics of the respondents, their livelihood strategies, access to health, food, water, finance and communication assets, social networks and sensitivities of people to food, water, health as a result as a result of climate change.

4.1. Socio Economic Characteristics of Respondents

The socio-economic characteristics of respondents are provided in Table 1. In all the coastal communities surveyed, 68.35% of the respondents are household heads, 24.15% are females. Most of them are married (75.59%) and 74.74% said they are educated. The respondents age 30-39 constitute the highest group with 36.24% followed by those between ages 40-49.

Table-1. Socio economic characteristics of respondents of coastal communities.

Variable	Frequency	Percentage
Household Head		
Yes	203	68.35
No	94	31.65
Gender		
Female	71	24.15
Male	223	75.85
Marital Status		
Divorced	3	1.02
Married	223	75.59
Single	65	22.03
Widowed	4	1.36
Education		
Yes	219	74.74
No	70	23.89
Others	4	1.37
Age		
10 to 19	7	2.44
20 to 29	56	19.51
30 to 39	104	36.24
40 to 49	61	21.25
50 to 59	41	14.29
60 to 69	13	4.53
70 to 79	2	0.70
80 to 89	3	1.05

The level of education of respondents is important in dealing with climate change issues. Of the respondents who are educated 97.31% reached the levels of pre-school, primary, secondary, adult-literacy or no formal and informal education (see Figure 1). All women interviewed are educated at the primary, secondary, and adult-literacy levels. Most of the respondents are Serrer (27.95 percent) followed by Wollof (20.54 percent) and Mandinka (20.20 percent).

4.2. Respondents' Income, Employment Type and Primary Source of Income

The survey addresses the primary source of income/livelihood, employment status, annual income from main occupation of the respondents. The annual incomes of all respondents are provided in Table 2. From all the zones surveyed, 44.67% of the respondents stated that their annual incomes are between 0 to less than 10,000 Dalasis. 83.51% earn less than 40,000 Dalasi in the year. It is only 16.49% of the respondents that earn above 40,000 dalasis in the year. Most women earn below D20,000 per annum (58%). 8.33% of women earn above D40,000. Poverty is really high among women in the coastal zones.

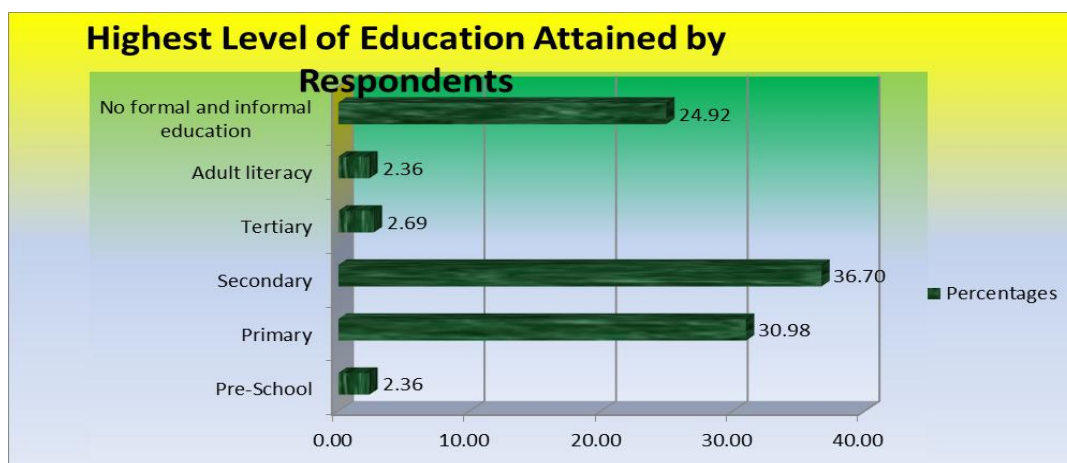


Figure-1. Highest level of education attained by respondents.

Table-2. Annual income of respondents: all communities.

Annual Income	Frequency	Percentage
0 to less than 10,000	130	44.67
10,000 to less than 20,000	73	25.09
20,000 to less than 30,000	30	10.31
30,000 to less than 40,000	10	3.44
Above 40,000	48	16.49
Total	291	

The results of the study as shown in the Figure 2 and Table 3 reveal that most of the respondents surveyed, about 80.34 percent are self-employed as fishermen, and fish dryers, fish smokers, ship builders and boat riders. 1.36 percent is not working. 87.67 percent of women whose likelihood depends on the coastal areas are self-employed. The primary source of income for most women in the coastal areas are fishing and fish drying and fish smoking (45.71%) followed by trading (32.86%).

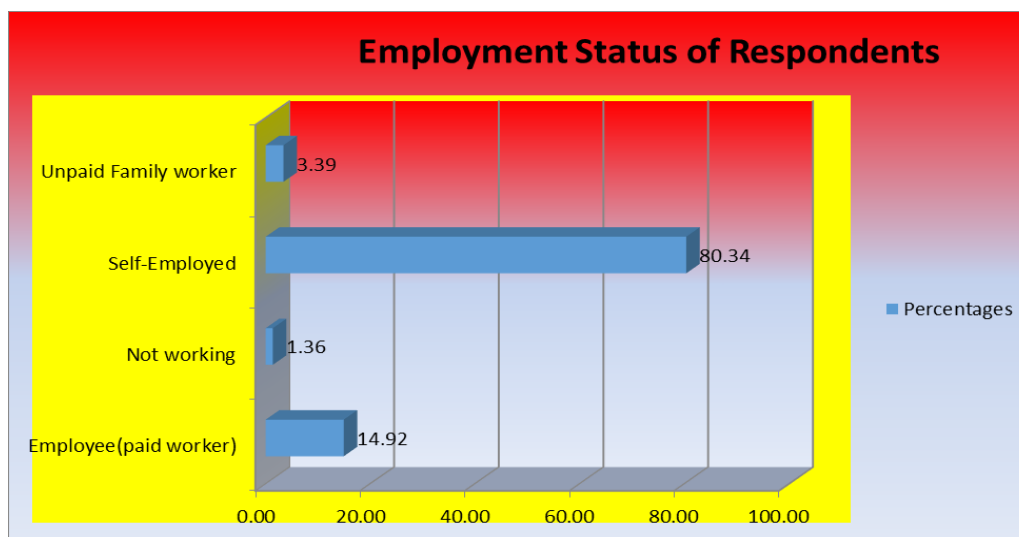


Figure-2. Employment status of respondents.

Of those who are self-employed 45.06% earn between 0 to less than 10,000 Dalasis per annum. 70.81 percent earn below 20,000 Dalasis. Only 15.88% of the self-employed earn above 40,000 per annum. Women who are self-employed 62.90% earn between 0 to less than 10,000 Dalasis per annum. 79.83 percent earn below 20,000 Dalasis. Only 6.45 percent of the self-employed earn above 40,000 per annum. This shows that the percentage of self employed women who earn below D10,000 for the year is much greater than that of men. Similarly, those who earn below D20,000 is greater among women than men. Overall, the levels of incomes along the coastal areas are low and limited hugely on activities along the coastline.

Table-3. Primary source of income.

Primary source of income	Freq.	Percent	Cum.
Batik	6	2.16	2.16
Boat building and boat riding	25	8.99	11.15
Driving	4	1.44	12.59
Farming	6	2.16	14.75
Fishing and fish dryers and smokers	153	55.04	69.78
Formal Employment	20	7.19	76.98
Hotel	8	2.88	79.86
Tie and dye or soap making	2	0.72	80.58
Trading	39	14.03	94.60
Others	15	5.40	100.00
Total	278	100.00	

The major source of income in the coastal area is fishing, fish drying and fish smoking. 55.04% of the respondents are into this activity. Boat building and boat riding constitute 8.99%. Hence fishing and fishing related activities comprises of more than half of the respondents' source of income.

4.3. Livelihood Strategies of Respondents

The livelihood strategies of respondents and their relationship to climate change threats are discussed below. Climate change can affect migration trends (both internal migration and international migration), access to communication assets, access to finance, access to resources, access to food, access to safe drinking water, and access to health facilities. Table 4 below showed the movement of respondents inter and intra zones. During the last 12 months 19.19% of the respondents live and work in a different zone. Most of the respondents stay in their own zone or cell. Therefore, there is less inter-zone labor mobility and more intra-zone mobility of labor. Since there is a lot of competition in the livelihood activities around the coastal areas, there is no incentive to move to the other zones. Also, during the last 12 months 14.81% of the respondents live and work in another country.

Table-4. Live and work in a different cell or in a different country.

		Live and work in another country last 12 months		
		No	Yes	Total
Live and work in another cell last 12 months	No	234	6	240
		97.50	2.50	100
		92.49	13.64	80.81
	Yes	19	38	57
		33.33	66.67	100.00
		7.51	86.36	19.19
	Total	253	44	297
		85.19	14.81	100.00
		100.00	100.00	100.0

4.4. Access and Climate Change

4.4.1. Communication Assets

Communication assets are important in business transactions and during variable and extreme climate. Figure 3 showed the communication assets of respondents. 88.55 percent of the respondents have access to mobile phones, 63.3 percent have access to radio and 46.8 percent have access to TV. 70.71 percent of them use Africell, 17.85% use Qcell, 14.82% use Gamcel and 11.11% use Comium as their mobile service providers. Some of the respondents use more than one service provider.



Figure-3. Communication assets of respondents.

4.5. Access to Micro Finance Institution (MFI)

The main source of capital for people whose livelihood depends on the coastal areas is other sources, followed by family and osusu (see Figure 4). Other sources which accounted for 60.94 include incomes from fishing, associations, friends, salary, pension and credit union. Traditional money lending and visacas are at the bottom. Respondents tend to shy away from traditional money lending and visacas due to the term of the loan and high interest rates attached.

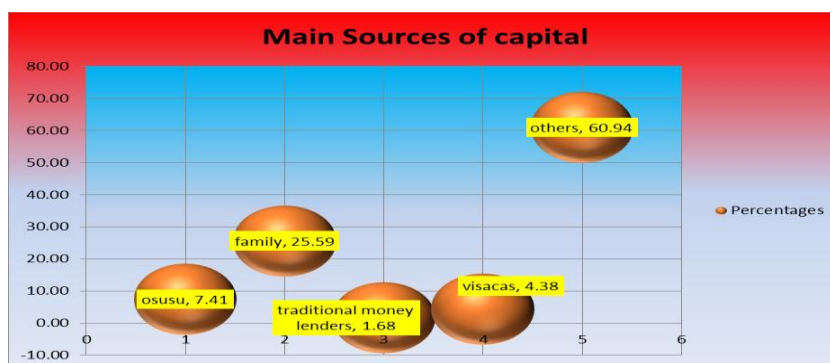


Figure-4. Main source of capital.

4.6. Access to Micro Finance Institution (MFI)

Access to financial resources is important to businesses in the coastal areas. The distance travelled to the nearest MFI is important to the respondents (See Table 5). Respondents with MFIs in their zones 67.86 percent travel less than 20 minutes to get to the nearest facility. 98.81 percent travel less than 1 hour to access the nearest microfinance facility. 74.74% get there by walking and the rest by bicycles and cars. Most of the borrowing is done individually. 76.32 percent of the respondents get credit as individuals. Group borrowing is 10.53 percent. The line of credit most of the time is below D20,000. 85.34 percent of the time they receive less than that amount.

Table-5. Access to MFI.

	Freq.	Percent	Cum.
0 to less than 20 minutes	57	67.86	67.86
20 to less than 40 minutes	19	22.62	90.48
40 to less than 1 hour	7	8.33	98.81
Above 1 hour	1	1.19	100.00
Total	84	100.00	

4.7. Access to Safe Drinking Water and Land

The study also considered access to safe drinking water and land as important factors affecting respondents in their relation to climate change issues. Figure 5 revealed that 60.14 percent of the respondents have no access to land and 4.71% stated that they do not have access to water. Of the women surveyed 67.15% of the females stated that they do not have the right to land ownership. Land tenure issues are a general problem in the country. Women lack both access and ownership to land.

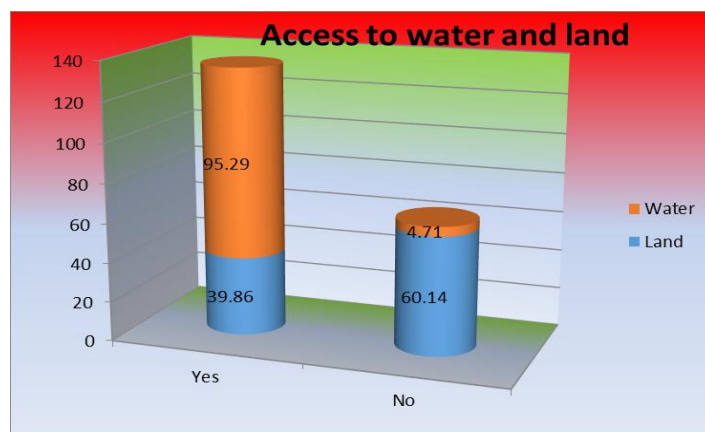


Figure-5. Access to safe drinking water and land.

4.8. Social Networks and Climate Change

Climate change affects the livelihoods of people and businesses along the coastal areas. Respondents receive and or give help in terms of cash, inputs, borrowing money, communication and training to others. Figure 6 provides a comparison of help given and received over the past one month. In the past one month 47.93% of respondents give cash help while 22.76% receive cash help. 17.24% give help in terms of inputs while 7.59% receive help in terms of inputs. In terms of borrowing money 1% give help while 1% receive help. For every help given in terms of communication and training more help is received. Overall, in the past one month, the ratio of help received to help given is 0.66:1. For every help given, 0.66 is received.

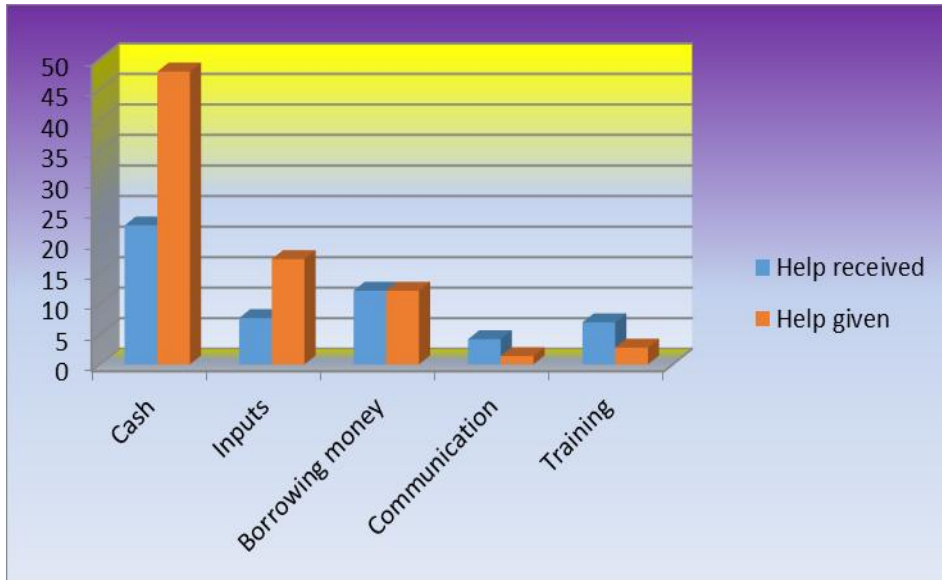


Figure-6. Help received and given in the past month.

Borrowing and lending in the past 6 months show the movement of capital or funds in the financial market. The frequency of borrowing and lending is provided in Figure 7. For every 1 case of lending there is 1.213 cases of borrowing. This zone is a net borrower. 69.28% of the respondents did not borrow money and 63.48 % did not lend money the past 6 months.

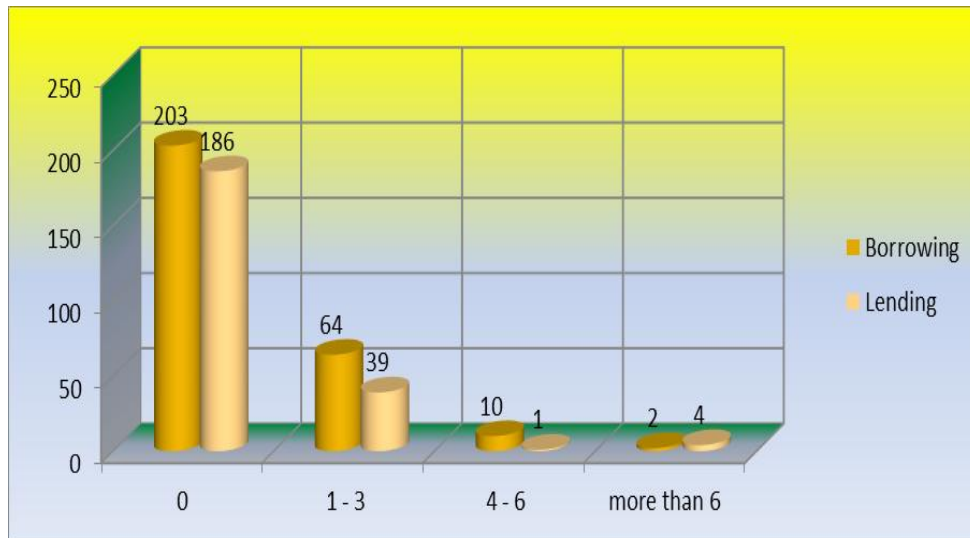


Figure-7. Borrowing and lending last 6 months.

If respondents want money they will borrow from banks, credit unions, family, friends and money lenders. Figure 8 provides the respondents sources of borrowing. Most of the respondents rank their friends as their source of borrowing followed by families and banks. Money lenders and credit unions are the last place they will go to if they need to borrow.

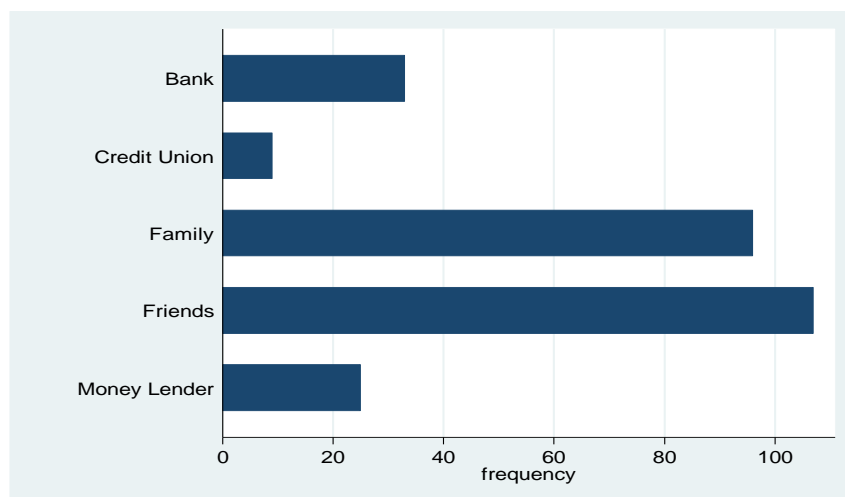


Figure-8. Borrowing money.

On how easy or difficult it is to borrow, most respondents Figure 9 stated borrowing is difficult or very difficult (54.25%). 33.69 percent are neutral.

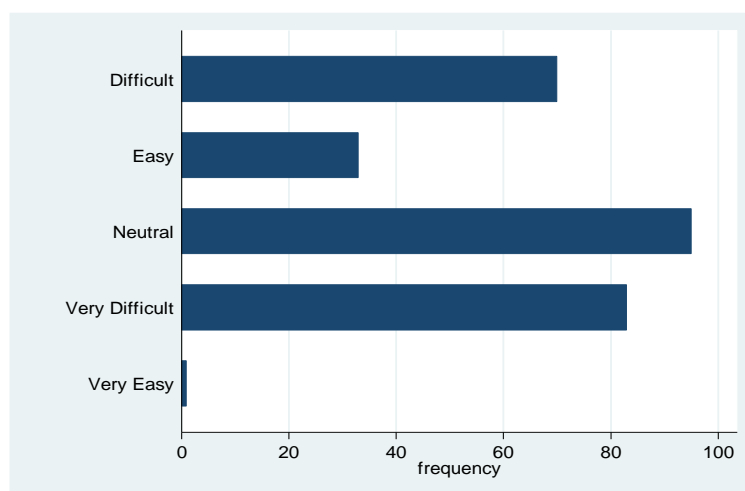


Figure-9. Ease of borrowing money.

4.9. Sensitivity to Health, Food, Water and Climate Change

4.9.1. Access to Healthcare and Sensitivity to Health

In addressing the climate change and its effects on respondent's health, access to health facilities is very important (See Table 6). 92.94 percent stated that it takes them less than 40 minutes to get to the nearest facility. 58.82% stated that it takes them less than 20 minutes. 6.27% stated that it takes them at least 40 to get to their nearest health facility.

On access for women, 87.5 percent stated that it takes them less than 40 minutes to get to the nearest facility while for men it is 94.84 percentage. In terms of access to health care, the gender gap is evident.

Table-6. Access to health.

	Freq.	Percent	Cum.
0 to less than 20 minutes	150	58.82	58.82
20 to less than 40 minutes	87	34.12	92.94
40 to less than 1 hour	10	3.92	96.86
Above 1 hour	6	2.35	99.22
Total	225	100.00	

Sensitivity of climate change to health is addressed looking at illness and missing work past 12 months, suffering from malaria, diarrhea, common cold and fever last 12 months and how has respondent's activities been constrained by lack of cash, water, electricity and knowledge, sea level rise, coastal erosion, flooding and

shortage of labor. Also the adaptation strategies used for health problems during variable and extreme climate such as Eat Healthy, Go to hospital, Cleanliness, Herbal Medicine and do nothing.

Figure 10 provides the diseases suffered by respondents in the last 12 months. 44.75% of the respondents did not get malaria, 66.85 percent did not get diarrhoea, 38.76 percent did not get common cold and 59.55 percent did not get fever the past 6 months. The respondents that suffered from these diseases are high.

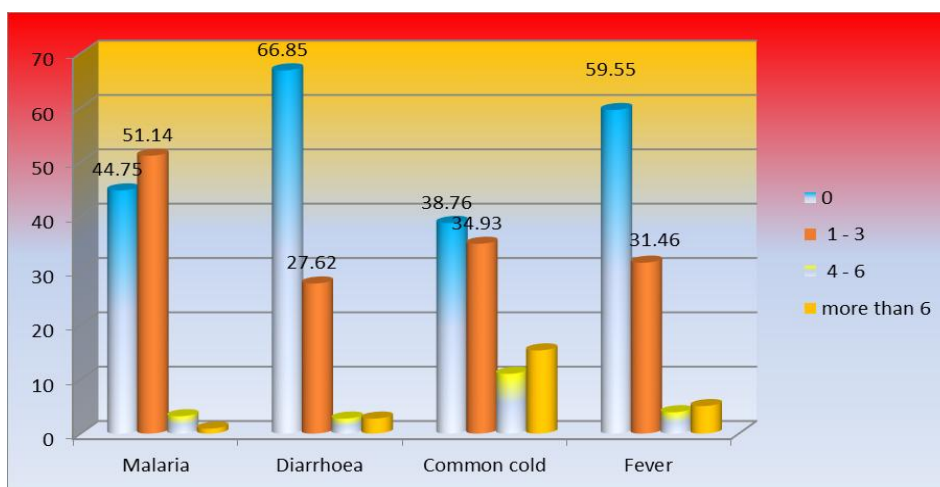


Figure-10. Diseases suffered last 12 months.

89.83% of the respondents believed their activities have been constrained by lack of cash, 26.78% by water, 34.58% electricity and 32.2% knowledge/techniques, 46.10% sea level rise, 25.85% coastal erosion, 41.02% flooding and 40% shortage of labor. They use adaptation strategies to deal with health problems during variable and extreme climate such as Eat Healthy, Go to hospital, Cleanliness, Herbal Medicine and do nothing. Figure 11 provides the adaptation strategies for respondents dealing with health problems due to climate change. 73.9 percent stated they will go to hospital during variable and extreme climate to deal with health problems. 1.36% states they will do nothing and 14.58 percent with use herbal medicine.

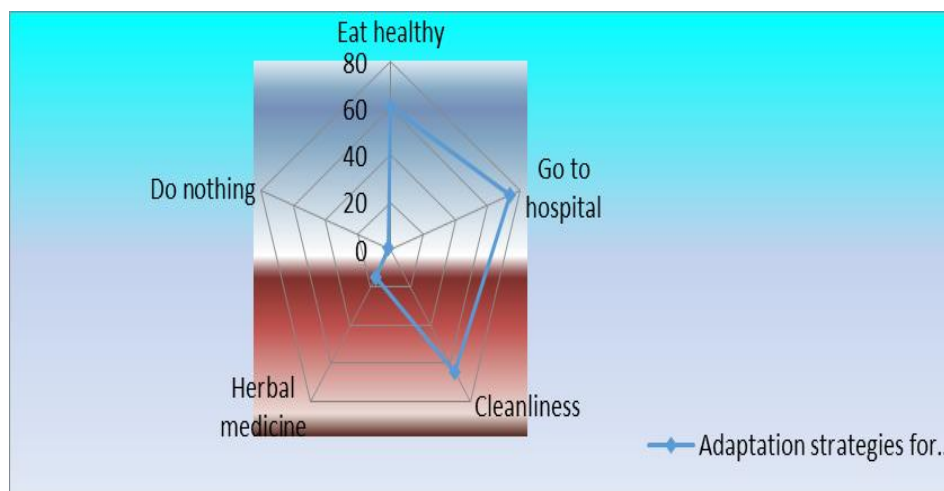


Figure-11. Adaptation strategies for health problems.

4.9.2. Sensitivity To Food

Access to food and how climate change will affect that is an important issue to consider. Table 7 provides the information on food shortage and the duration of the shortage. Most respondents state that they did not experience shortage of food in a year (85.42%). The rest experiences shortages of few months.

Table-7. Food shortage.

	Freq.	Percent	Cum.
0 to less than 20 minutes	252	85.42	85.42
20 to less than 40 minutes	35	11.86	97.29
40 to less than 1 hour	7	2.37	99.66
Above 1 hour	1	0.34	100.00
Total	295	100.00	

Prices of food items have been increasing over time. price of food last year (according to 92.41% of respondents) and last 5 years has been increasing (according to 86% of respondents). The main sources of food supplies according to 98.65% of respondents are buy from shops and markets, 1.65% stated it is mainly through exchange for labor, 0.68% stated that they mainly borrow from neighbors and 0.34% stated from remittances.

4.9.3. Sensitivity to Water

The main source of drinking water is piped water. 94.59 percent stated that their main source of drinking water is piped water and the rest use dug well. The time travelled to get to the nearest facility to fetch water is provided in Table 8. Most of the respondents stated that it takes them less than 20 minutes to fetch water (90.88 percent). Almost all of them stated that it takes less than 40 minutes to fetch water (99.66%). Supply and quality of of drinking water during the last 12 months and last 5 years have been improving.

Table-8. Time to nearest facility to fetch water.

Time to get to the nearest facility	Freq.	Percent	Cum.
0 to less than 20 minutes	269	90.88	90.88
20 to less than 40 minutes	26	8.78	99.66
Above 1 hour	1	0.34	100.00
Total	296	100.00	

4.9.4. Sensitivity to Exposure

81.01 percent of respondents stated that they are aware of climate change. They get information about climate change variability through newspaper (4.46%), internet (5.80%), radio (61.61%), television (59.82%) and others (15.11%). 63.5 percent stated that they put up adaptation strategies to cope with climate change variability ranging from saving, borrowing money, involve in other livelihood activities, eat healthy and cleanliness, Government and NGO assistance to reduce consumption. According to the respondents the favored adaptation strategy is to save (39.01%) followed by involving in other livelihood activities (36.32%). This is a slight different between the percentage of respondents that believe their home can or cannot withstand exposure to winds, coastal erosion, sea level rise and flooding. 44.55 percent believe their home can withstand exposure to winds, coastal erosion, sea level rise and flooding while 46.05% believe their homes cannot withstand those exposures.

During the last 12 months, households experience the following climate change threats: flooding, drought, sea level rise and coastal erosion. 40.30 percent of respondents stated that they experience threats in terms of flooding and 52.92 percent said they received warning of such threats. When it comes to coastal erosion, 23.58% experience coastal erosion threat and 36.11 said they were warned of such shocks. 18.83 percent stated they experience climate change threat in terms of drought and 33.34% stated receiving warning of such threats. With sea level rise, 39.67% stated they experience threat related to sea level rise and 48.43% stated receiving warning of such shocks.

4.10. Adaptation Scenarios

The adaptation strategies proposed include do nothing, community involvement, financial assistance, government assistance, cleaning the environment -“set-settal”, construction of roads and other infrastructure, storage and toilet facilities, proper drainage systems, tree planting and protection of coastal areas. 73.76 percent of the respondents did not like the idea of doing nothing. Most of them like the other adaptation options mentioned.

5. Conclusion

The results show that most of the respondents are household heads, males, married and educated. Most women interviewed are educated at the primary, secondary, and adult-literacy levels. Close to 17% of the respondents earn above 40,000 Dalasis in the year and most women earn below D20,000 per annum. Majority of respondents are self-employed as fishermen, and fish dryers, fish smokers, ship builders and boat riders. Fishing and fishing related activities comprises of more than half of the respondents’ source of income.

Majority of respondents have access to mobile phones followed by radio and TV. Sources of capital for coastal dwellers are incomes from fishing, associations, friends, salary, pension and credit union. This is followed by family and osusu. Most of the borrowing is done individually and the line of credit is mostly below D20,000 and more than 85% receive less than that amount. More than 60% of the respondents have no access to land and 4.71% stated that they do not have access to water. About 48% of respondents give cash help while 22.76% receive cash help. In terms of borrowing money 1% give help while 1% receive help. About 70% of the respondents did not borrow money and 63.48 % did not lend money the past 6 months. Coastal dwellers find it difficult to borrow for investment and consumption. Most of the respondents rank their friends as their source of borrowing followed by families and banks. Access to health facilities is a major challenge to coastal inhabitants. About 93% stated that it takes them less than 40 minutes to get to the nearest health facility. In

the last 12 months, more than 38% of the respondents get malaria, diarrhea, common cold and get fever. Activities are constrained by lack of cash, water, electricity, sea level rise, coastal erosion, flooding and shortage of labor. Awareness of climate change is very high among respondents. More than 81 percent of respondents are aware of climate change and get information about climate change variability through newspaper, internet, radio and television. Radio is ranked highest followed TV. Adaptation strategies employed to deal with health problems during variable and extreme climate are going to hospital, cleanliness, eating healthy using herbal medicine. More than 85% of the respondents did not experience shortage of food in a year. But price of food has been increasing over the last 5 years. More than 94% of respondents use piped water as their main source of drinking water and the rest use dug well. According to the respondents the favored adaptation strategy is to saving followed by involving in other livelihood activities. The adaptation strategies proposed include do nothing, community involvement, financial assistance, government assistance, cleaning the environment –“set-settal”, construction of roads and other infrastructure, storage and toilet facilities, proper drainage systems, tree planting and protection of coastal areas.

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